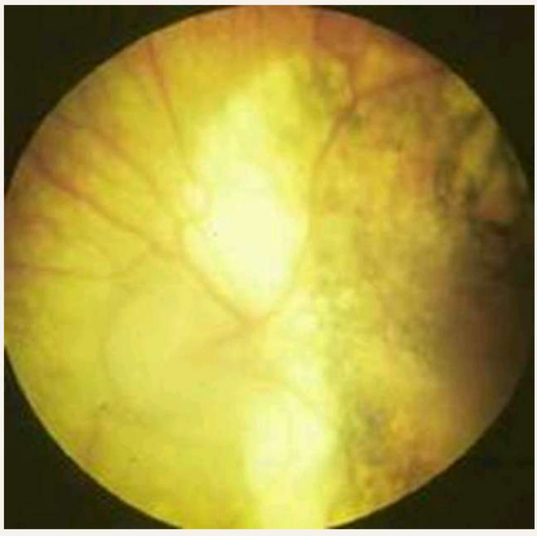

اللهم أنر قبر منْ حنّ لهُ القلب
اللهم هب له سعة في قبره لا يرا لها نهاية
هب لمضجعه طيبا وَ لظلمته نورا
ولذنوبه غفراناً وَ برّد قبره
وزده احساناً فوق احسانه
واجعل الجنة مسكنه

A 14-year-old boy is referred by his general practitioner (GP) after he presented complaining of right ocular pain and blurred, 'hazy' vision for several weeks.

The fundal appearance is shown below:



What is the most likely cause of this appearance?

A	Toxoplasmosis
B	Retinitis pigmentosa
C	Retrobulbar neuritis
D	Cytomegalovirus (CMV)
E	Retinal detachment

70708

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Calculator

Normal Values

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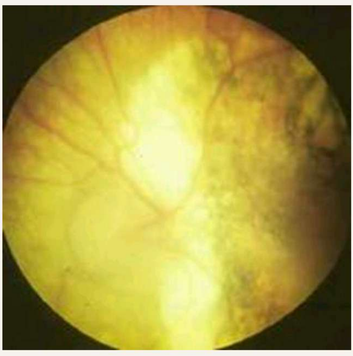

What is the most likely cause of this appearance?

A	Toxoplasmosis
B	Retinitis pigmentosa
C	Retrobulbar neuritis
D	Cytomegalovirus (CMV)
E	Retinal detachment

Explanation

This is chorioretinitis caused by Toxoplasma gondii infection. The symptoms associated with ocular toxoplasmosis include unilateral, mild ocular pain, blurred vision and new onset of floating spots. Patients often describe their vision as hazy. Clinical findings may include granulomatous iritis, vitritis, optic disc swelling, neuroretinitis, vasculitis and retinal vein occlusion in the vicinity of the inflammation, in the actively involved eye. Fundoscopically, active toxoplasmosis presents with white–yellow, chorioretinal lesions and vitreous cells. There may be old, inactive lesions in the other eye. Congenital toxoplasmosis accounts for the majority of cases encountered in clinical practice. Infection may also occur from ingestion of contaminated or undercooked meat and dairy products, and direct or indirect ingestion of cat faeces. Treatment is with pyrimethamine/sulphadoxine for 6–12 months or longer if relapses occur.

70708

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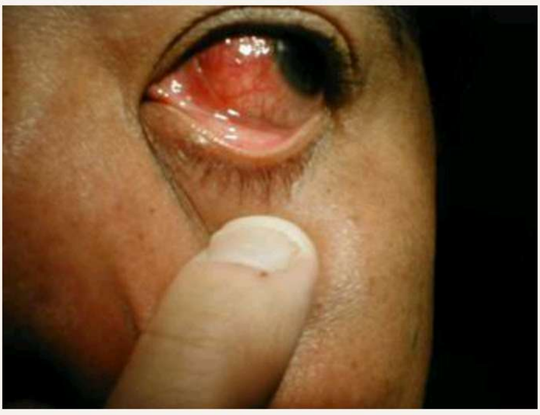
Difficulty: Average

Peer Responses %

Session Progress

Responses Correct:	0
Responses Incorrect:	1
Responses Total:	1
Responses - % Correct:	0%

A 34-year-old man presents to the emergency department with general malaise and a red eye (see picture, below). He describes an intense, dull, aching sensation in the eye itself and around the orbital area as well as blurred vision. Over the past week he has had a sore throat and intermittent fever and has had a course of antibiotics from his general practitioner. He then developed bilateral swollen knees and ankles with a rash over both shins. Visual acuity is 6/6 in the right eye and 6/24 in the left (affected) eye.



Picture courtesy of Charlie Goldberg, M.D., UCSD School of Medicine and VA Medical Center, San Diego, California

What is the most likely ophthalmological diagnosis?

A	Acute iritis
B	Episcleritis
C	Bacterial conjunctivitis
D	Toxocara
E	Herpes zoster conjunctivitis

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Calculator

Normal Values

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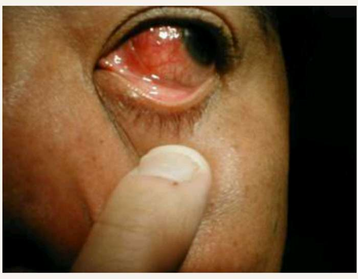

Picture courtesy of Charlie Goldberg, M.D., UCSD School of Medicine and VA Medical Center, San Diego, California

What is the most likely ophthalmological diagnosis?

A	Acute iritis
B	Episcleritis
C	Bacterial conjunctivitis
D	Toxocara
E	Herpes zoster conjunctivitis

Explanation

This condition is seen mainly in young people, and may occasionally be associated with systemic conditions such as ankylosing spondylitis and sarcoidosis (as in this case); other associated conditions include Reiter's syndrome, syphilis, herpes, toxoplasmosis, inflammatory bowel disease and psoriatic arthropathy. Presentation is with a red, painful eye (with pain being a more severe and more constant feature than in episcleritis, which may produce mild-moderate discomfort in some but not all patients), and visual acuity is reduced to a varying degree. This latter aspect would not be expected to be present in episcleritis or conjunctivitis. The pupil is usually constricted or irregular, reacting poorly to light. The patient should be seen by an ophthalmologist within 24 h for slit lamp diagnosis. Treatment is then with topical steroids and mydriatic drops (to reduce the risk of acute glaucoma due to the iris sticking to the cornea). Appropriate investigations for underlying systemic disease should then be carried out if there is a suspicion of this.

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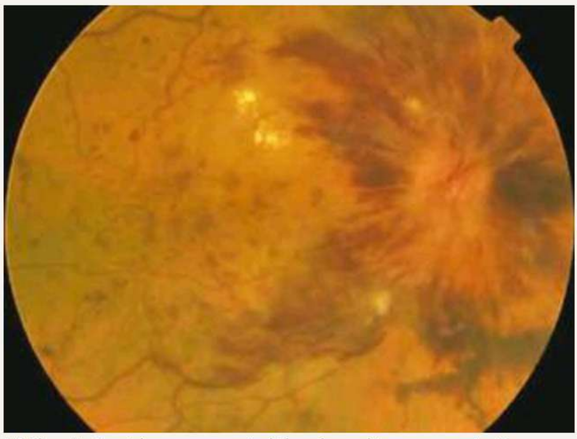
Difficulty: Difficult

Peer Responses %

Session Progress

Responses Correct:	0
Responses Incorrect:	2
Responses Total:	2
Responses - % Correct:	0%

65-year-old woman with a past history of hypertension presents with transient visual obscurations of the right eye, followed by progressive loss of vision over the last 6 days. She has some vague discomfort of the right eye. On examination acuity is 6/36 in the affected eye, and 6/12 in the left eye. Pupillary reactions are normal. The fundoscopic appearance is shown below:



What is the most likely diagnosis?

A	Papilloedema due to space-occupying lesion
B	Papilloedema due to idiopathic intracranial hypertension
C	Branch retinal vein occlusion (BRVO)
D	Central retinal vein occlusion (CRVO)
E	Central retinal artery occlusion (CRAO)

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Calculator

Normal Values

Three days after being admitted for a myocardial infarction, a male patient complains of sudden change in vision. The medical registrar examines the patient and finds that the patient's vision in both eyes is significantly reduced although the patient still claims that he can see. The pupils are equal in size and the pupil responses are normal with normal fundoscopy. Significantly, the patient has now developed atrial fibrillation. A referral is made to the ophthalmologist who confirms bilateral blindness. Despite this, however, the patient fervently believes that he can see and has taken to describing objects that he has not seen previously in discriminating detail.

What is the most likely diagnosis?

A	Bilateral central retinal artery occlusion
B	Bilateral central retinal vein occlusion
C	Bilateral posterior cerebral artery occlusion
D	Bilateral occipital cortex infarction
E	Distal basilar artery occlusion

Explanation

The supply of the posterior cerebral arteries includes the medial area of the occipital lobes and the inferior aspects of the temporal lobes. Bilateral infarctions of the primary visual cortex located in the occipital lobes produces varying degrees of cortical blindness depending upon the extent of the lesion. Cortically blind patients have no vision but their pupillary responses are intact and fundoscopy is also normal. However, both visual evoked potentials and optokinetic nystagmus are absent. If the lesions are more extensive, patients may be in denial of their blindness, a condition termed Anton's syndrome, a state in which patients fervently believes that they can see when they cannot.

70711

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Difficulty: Easy

Peer Responses %

Session Progress

Responses Correct:	0
Responses Incorrect:	4
Responses Total:	4
Responses - % Correct:	0%

A 21-year old college student noticed pain in her right eye, which increased on movement, of one week's duration. She then noticed blurring of vision of the same eye on the 10th day as the pain was spontaneously declining. On examination temperature was 37°C, pulse rate was 84/min and blood pressure was 120/80 mmHg.She was alert and her cognition was normal. The visual acuity was 6/12 for the right eye and 6/6 for the left eye. Visual field examination by confrontation technique suggested a central scotoma. A relative afferent pupillary defect also was noted in the right eye. The right optic disc was swollen and the left was normal. Neurological examination was otherwise unremarkable.

Investigations revealed:

White blood count (WBC)	5.0×10^9/l
Erythrocyte sedimentation rate (ESR)	20 mm in 1 h
Alanine aminotransferase (ALT)	30 U/l
Blood urea	8 mmol/l
Serum creatinine	120 mol/l
Antinuclear antibody	Mild positive
Magnetic resonance imaging (MRI) of the brain was normal	

Cerebrospinal fluid (CSF):

Lymphocytes	4/mm^3
Protein	400 mg/l
Glucose	5.0 mmol/l, with a random blood glucose of 7.0 mmol/l
Oligoclonal bands	Negative

What is the most likely diagnosis?

A	Pseudo tumour cerebri
B	Papillitis (optic neuritis)
C	Anterior ischemic optic neuropathy (AION)
D	Pseudo papilloedema
E	Toxic optic neuritis

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Calculator

Normal Values

A 21-year old college student noticed pain in her right eye, which increased on movement, of one week's duration. She then noticed blurring of vision of the same eye on the 10th day as the pain was spontaneously declining. On examination temperature was 37°C, pulse rate was 84/min and blood pressure was 120/80 mmHg.She was alert and her cognition was normal. The visual acuity was 6/12 for the right eye and 6/6 for the left eye. Visual field examination by confrontation technique suggested a central scotoma. A relative afferent pupillary defect also was noted in the right eye. The right optic disc was swollen and the left was normal. Neurological examination was otherwise unremarkable.

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C	Anterior ischemic optic neuropathy (AION)
D	Pseudo papilloedema
E	Toxic optic neuritis

Explanation

Papillitis (optic neuritis) is the inflammation of the optic nerve with swelling of the optic disc. In a proportion of such patients no cause of optic neuropathy can be found. However the first bout of multiple sclerosis (MS) is often suspected and indeed about 50% of such patients develop other signs of MS in 5 years. The typical situation is one in which an adolescent develops rapid diminution of vision in one eye which may progress to complete blindness. Pain on movement and tenderness of the globe; a central scotoma, a relative afferent pupillary defect and a profound visual loss are the features that distinguish it from papilloedma. Anterior ischemic optic neuropathy (AION) occurs in patients over the age of 50 years. Its onset is painless and abrupt. It may be associated with giant cell arteritis. Toxic and nutritional optic neuropathy causes simultaneous impairment of vision in both eyes (tobacco alcohol amblyopia).

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Difficulty: Average

Peer Responses %

Session Progress

Responses Correct:	0
Responses Incorrect:	5
Responses Total:	5
Responses - % Correct:	0%

A 76-year-old Asian woman presents to the emergency department. She complains of sudden onset headache that began on leaving the cinema. She further describes altered vision, and intractable vomiting. Examination is difficult as she is so agitated. Positive findings are pallor and sweating, she has a fixed dilated right pupil with lacrimation and injected conjunctiva. Fundoscopy is impossible.

What is the optimal initial management?

A	Intravenous acetazolamide
B	Subcutaneous sumatriptan
C	Intravenous dexamethasone
D	Opiates and high-flow oxygen
E	Topical chloramphenicol

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Calculator

Normal Values

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B	Subcutaneous sumatriptan
C	Intravenous dexamethasone
D	Opiates and high-flow oxygen
E	Topical chloramphenicol

Explanation

This patient presents with acute closed angle glaucoma. This is caused by a sudden rise in intraocular pressure secondary to impaired flow of aqueous humour. This condition often presents to physicians and can be misdiagnosed because of associated headache and abdominal pain. Physical examination reveals decreased acuity, conjunctival injection and a fixed mid-position pupil often oval in shape. Immediate treatment is necessary to preserve vision. Urgent ophthalmology referral is needed. While waiting for specialist input, the carbonic-anhydrase inhibitor acetazolamide is given to decrease aqueous humour production.

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Difficulty: Average

Peer Responses %

Session Progress

Responses Correct:	0
Responses Incorrect:	6
Responses Total:	6
Responses - % Correct:	0%

A 38-year-old man known to the neurology clinic with poorly controlled epilepsy presents unscheduled to the outpatient department. He has defaulted from neurology follow-up, but tells you he has been seizure free on his present medication. Attendance was prompted by recent optometrist assessment and the unexpected finding of reduced peripheral vision. Past medical history is of epilepsy, substance abuse and tuberculosis. Current medication: sodium valproate, vigabatrin, lamotrigine, Rifater (isoniazid, rifampacin, pyrazinamide), ethambutol. On examination he has severe constriction of visual fields; however, acuity, colour vision and fundoscopy are normal.

What change must you make to his medication?

A	Add pyridoxine
B	Stop sodium valproate
C	Stop ethambutol
D	Add vitamin B compound
E	Stop vigabatrin

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Calculator

Normal Values

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A	Add pyridoxine
B	Stop sodium valproate
C	Stop ethambutol
D	Add vitamin B compound
E	Stop vigabatrin

Explanation

The anticonvulsant vigabatrin is now recognised to cause irreversible visual-field defects in up to 30% of users. The defect is often asymptomatic in the early stages, affecting only peripheral fields with no alteration in acuity. Changes can occur as early as 1 month into treatment. This side effect was first noted in 1997, and in recent years the drug has been used only in cases of severe, treatment-resistant epilepsy and the Lennox–Gastaut syndrome in children. In cases where therapy is initiated, regular visual-field screening is required. Other side effects include depression, psychosis and sedation. The anti-tuberculous agent ethambutol causes optic neuritis, and regular monitoring of acuity is required, particularly in patients with impaired renal function.

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Difficulty: Average

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Session Progress

Responses Correct:	0
Responses Incorrect:	7
Responses Total:	7
Responses - % Correct:	0%

A 6-year-old child is brought to the GP by her mother who is concerned about the severity of the eye infection of her child. She reports that her daughter began to complain of a red, sore and watering left eye about 2 days ago. The mother thought it was irritation and gave her daughter's eye a wash with a leading brand of eyewash. However, her symptoms did not settle and in the last 24 hours the child has developed a number of blisters on the upper eyelid which are very itchy. Some of these blisters have begun to ooze and the child now has a sticky yellow discharge as well. On examination, there are multiple vesicles on the upper lid, some of which appear excoriated, but these are not in any particular dermatomal pattern. There is an associated yellow discharge and large crusts on the eyelashes. The conjunctiva is inflamed but there is no obvious corneal involvement. Eversion of the upper eyelid shows multiple follicles on the inner lid surface. A preauricular lymph node is palpable on the left side.

What is the most likely causative organism?

A	Chlamydia trachomatis
B	Staphylococcus aureus
C	Molluscum contagiosum
D	Herpes simplex virus (HSV)
E	Varicella zoster virus (VZV)

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Calculator

Normal Values

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Explanation

Viral conjunctivitis is common in patients of all ages. Of the viruses responsible for this condition, herpes simplex virus (HSV) is by far the most problematic. A primary ocular infection with HSV is common in children and causes a follicular conjunctivitis. Patients often present with a red and watering eye with concomitant eyelid skin involvement showing multiple vesicles in a localised area. The eyelids may be swollen and there may also be an ulcerative blepharitis. If a discharge is present, it tends to be clear and mucus-like, characteristic of viral infections. A yellow discharge normally indicates either a primary bacterial infection or a secondary bacterial infection after a primary viral infection. VZV infections tend to affect the skin in a dermatomal pattern of vesicles. Molluscum contagiosum causes a chronic follicular conjunctivitis associated with a small, elevated, umbilicated nodule(s) near the lid margin.

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Difficulty: Average

Peer Responses %

Session Progress

Responses Correct:	0
Responses Incorrect:	8
Responses Total:	8
Responses - % Correct:	0%

A 63-year-old known to have poorly controlled type-2 diabetes presented to the ophthalmologist on call complaining of floaters and decreased vision. The ophthalmologist has recommended that the patient has treatment for proliferative diabetic retinopathy (PDR) but has also referred the patient to the medical team for a review of the patient's diabetic control. In their referral note, the ophthalmologist has written that the patient has the 'usual' signs seen with PDR in the eye.

Which of these clinical signs does NOT fit with this description?

A	Neovascularisation of the iris
B	Neovascularisation of the retina
C	Macular oedema
D	Papilloedema
E	Preretinal haemorrhage

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Calculator

Normal Values

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A	Neovascularisation of the iris
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C	Macular oedema
D	Papilloedema
E	Preretinal haemorrhage

Explanation

There are multiple ocular complications associated with diabetes but diabetic retinopathy is potentially the most blinding of these. Most patients tend to be asymptomatic with retinopathy, with the earliest symptoms being a reduction of visual acuity and/or the presence of floaters. Visual loss can result from chronic macular oedema, vitreous haemorrhage, retinal detachment, acute glaucoma secondary to neovascularisation of the drainage channels of the anterior chamber, and extensive panretinal photocoagulation to treat the disease at the back of the eye. In addition, patients with diabetes are at greater risk of developing other eye problems, such as a central retinal vein occlusion (CRVO), which in itself may also compromise vision. Of the conditions listed above, only papilloedema is not directly due to PDR but may occur in association with a CRVO secondary to diabetes mellitus.

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Difficulty: Average

Peer Responses %

Session Progress

Responses Correct:	0
Responses Incorrect:	9
Responses Total:	9
Responses - % Correct:	0%

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Calculator

Normal Values

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Difficulty: Average

Peer Responses %

Session Progress

Responses Correct:	0
Responses Incorrect:	1
Responses Total:	1
Responses - % Correct:	0%

A 26-year-old female is referred by her GP with a 24-hour history of gradual deterioration in her right visual acuity, associated with pain on eye movement, to the extent that she can now only perceive light. She also complains of a general feeling of fatigue for the past few weeks. She has no other neurological symptoms. There is nil to find on general examination but on fundoscopy of her right eye, the optic disc appears to be swollen. Her left optic disc is normal in appearance.

What would be the most useful investigation to institute at this stage?

A	Lumbar puncture
B	CT scan head
C	MRI scan head
D	Erythrocyte sedimentation rate (ESR) and CRP
E	Visual evoked responses

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Calculator

Normal Values

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B	CT scan head
C	MRI scan head
D	Erythrocyte sedimentation rate (ESR) and CRP
E	Visual evoked responses

Explanation

The likely diagnosis here is optic neuritis (ON), which is a demyelinating inflammation of the optic nerve and although it is strongly associated with multiple sclerosis (MS), it can also occur on its own.

Decreased visual acuity secondary to optic neuritis may be permanent. Optic neuritis affects Caucasians more commonly than other races and there is a male:female ratio of 1:2. Symptoms include a rapid decline in visual acuity in one eye (rarely both) associated with pain exacerbated by eye movement and dyschromatopsia (change in colour perception).

Typically, patients with first time acute ON are otherwise healthy young adults. In some cases, a history of preceding viral illness may be present. In acute ON, the optic disc may appear normal since two thirds of cases of ON are retrobulbar. However, the optic nerve may become pale over time. Patients with MS may have recurrent attacks of ON. Therefore, a history of previous episodes of decreased vision in the same or the fellow eye must be sought. A previous history of neurological problems, such as transient episodes of extremity/facial numbness, weakness or pins and needles, suggests a diagnosis of MS. A family history of MS may exist. In a typical case of ON without any clinical signs and symptoms of a systemic disease the yield from blood tests is low and cerebrospinal fluid (CSF) examination is non-contributory to the diagnosis. MRI can be used to assess inflammatory changes in the optic nerves and helps exclude structural lesions.

The treatment of optic neuritis remains somewhat controversial despite a large-scale study (the 'optic neuritis treatment trial' (ONTT) (Beck RW, Cleary PA, Anderson MM Jr, Keltner JL, Shults WT, Kaufman DI, the Ocular Neuritis Study Group. A randomized, controlled trial of corticosteroids in the treatment of acute optic neuritis. N Engl. J Med. 1992, 326:581–588). In the majority of cases treatment for optic neuritis is not indicated, especially for a first episode in an otherwise healthy adult with a normal other eye.

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Difficulty: Average

Peer Responses %

Session Progress

Responses Correct:	0
Responses Incorrect:	2
Responses Total:	2
Responses - % Correct:	0%

A 56-year-old woman with a history of Type 2 diabetes and hypertension presents to the Emergency room, she has taken up badminton to lose weight and presents with sudden loss of the upper field of vision in her right eye during a game. On examination the left eye shows evidence of hypertensive changes, the right reveals a swollen optic disc with retinal haemorrhages in all four quadrants, there is an afferent pupillary defect. Her BP is 148/92 mmHg.

Investigations;

Hb	13.1 g/dl
WCC	5.5 $x10^9$/l
PLT	199 $x10^9$/l
Na^+	140 mmol/l
K^+	4.9 mmol/l
Creatinine	130 µ mol/l
Cholesterol	6.2 mmol/l
HbA1c	62.84 mmol/mol (7.9 %)

Which of the following is the most likely diagnosis?

A	Optic neuritis
B	Anterior ischaemic optic neuropathy
C	Branch retinal vein occlusion
D	Central retinal vein occlusion
E	Central retinal artery occlusion

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Calculator

Normal Values

A 56-year-old woman with a history of Type 2 diabetes and hypertension presents to the Emergency room, she has taken up badminton to lose weight and presents with sudden loss of the upper field of vision in her right eye during a game. On examination the left eye shows evidence of hypertensive changes, the right reveals a swollen optic disc with retinal haemorrhages in all four quadrants, there is an afferent pupillary defect. Her BP is 148/92 mmHg.

Investigations;

Hb	13.1 g/dl
WCC	5.5 x10^9/l
PLT	199 x10^9/l
Na^+	140 mmol/l
K^+	4.9 mmol/l
Creatinine	130 µ mol/l
Cholesterol	6.2 mmol/l
HbA1c	62.84 mmol/mol (7.9 %)

Which of the following is the most likely diagnosis?

A	Optic neuritis
B	Anterior ischaemic optic neuropathy
C	Branch retinal vein occlusion
D	Central retinal vein occlusion
E	Central retinal artery occlusion

Explanation

The correct answer is central retinal vein occlusion. Both retinal haemorrhages and oedema of the optic disc, with an afferent pupil defect are typical of the condition. The area of visual field loss may be variable, particularly during the early stages after retinal vein thrombosis occurs. Colour Doppler imaging is a non-invasive way to image the retrobulbar circulation, but the investigation of choice is fluoroscein angiography. Blood work is targeted at identifying any underlying cause of hypercoagulability and consideration of either anti-platelet agents such as aspirin or anti-coagulation with warfarin. No effective treatments for central retinal vein occlusion have been identified although intra-ocular corticosteroids may have a role to play in associated macular oedema. Ischaemic optic neuropathy usually presents with a pale white oedematous optic disc.

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Responses Correct:	0
Responses Incorrect:	3
Responses Total:	3
Responses - % Correct:	0%

A 56-year-old woman has been complaining of right sided orbital pain for the last 2 weeks. Pain is much worse in evenings usually while she is reading and at that time she sees a halo around lights and gets a headache on the same side as the orbital pain. It resolves when she goes to bed. Her vision in the right eye has deteriorated significantly over the last day. On examination her BP is 144/72 mmHg, pulse is 75/min and regular. Visual acuity is 6/6 in the left eye, but hand movements only in the right eye. There is corneal and scleral injection on the right.

Which of the following is the most likely diagnosis?

A	Tension headache
B	Cluster head ache
C	Acute closed angle glaucoma
D	Episcleritis
E	Optic neuritis

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Calculator

Normal Values

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A 56-year-old woman has been complaining of right sided orbital pain for the last 2 weeks. Pain is much worse in evenings usually while she is reading and at that time she sees a halo around lights and gets a headache on the same side as the orbital pain. It resolves when she goes to bed. Her vision in the right eye has deteriorated significantly over the last day. On examination her BP is 144/72 mmHg, pulse is 75/min and regular. Visual acuity is 6/6 in the left eye, but hand movements only in the right eye. There is corneal and scleral injection on the right.

Which of the following is the most likely diagnosis?

A	Tension headache
B	Cluster head ache
C	Acute closed angle glaucoma
D	Episcleritis
E	Optic neuritis

Explanation

Orbital pain and seeing haloed vision are typical features associated with acute closed angle glaucoma, as is corneal and scleral injection. The diagnosis is a clinical one, supported by the use of tonometry to measure intra-ocular pressure. Acetazolamide, topical steroids and topical beta blockers are the initial therapies of choice. Whilst cluster headache can present with autonomic symptoms, it is not associated with visual loss. Symptoms are often reported as being worse in the evening; this may be a combination of increased eye strain, difficulty focusing in darker light, and the fact that one commonly reported symptom is visualising haloes around artificial light.

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Session Progress

Responses Correct:	0
Responses Incorrect:	4
Responses Total:	4
Responses - % Correct:	0%

A 53-year-old woman presents to the accident and emergency department complaining of a reduction in her left vision noticed upon waking the same morning. She feels otherwise well. She reports no pain. Her past medical history is only significant for polymyalgia rheumatica for which she takes 2.5 mg prednisolone once daily and says this has been associated with a general reduction in the frequency of her headaches although they have not gone away completely. On examination of her eyes, the Snellen visual acuity is recorded as 6/9 in her right eye and 6/36 in her left eye. The left fundus is pale and there is diffuse optic disc swelling. No cotton wool spots or haemorrhages were seen in the periphery. The right fundus appeared normal.

What is the most likely diagnosis of the visual loss?

A	Central retinal vein occlusion
B	Central retinal artery occlusion
C	Glaucoma
D	Papilloedema
E	Acute anterior ischaemic optic neuropathy

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Calculator

Normal Values

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What is the most likely diagnosis of the visual loss?

A	Central retinal vein occlusion
B	Central retinal artery occlusion
C	Glaucoma
D	Papilloedema
E	Acute anterior ischaemic optic neuropathy

Explanation

A close association exists between giant cell arteritis (GCA) and polymyalgia rheumatica. Both diseases frequently affect the same individuals. GCA is a systemic inflammatory vasculitis of unknown aetiology that affects medium- and large-sized arteries. It occurs more commonly in women and almost exclusively in patients older than 50 years of age. Visual symptoms manifest in around 50% of patients with GCA with the commonest cause of visual loss being anterior ischaemic optic neuropathy (AION). This condition results from ischemia of the optic nerve head which is supplied by the posterior ciliary arteries and typically presents with a chalky white oedematous optic disc. Of the other conditions listed, central retinal artery occlusion and glaucoma do not present with a swollen disc, with the former condition also being characterised by a very pale fundus. Central retinal vein occlusion tends to have other signs evident in the fundus (eg haemorrhages, cotton wool spots). The history is very suggestive of the diagnosis in this case. This is an emergency and it is crucial that she is treated with high dose corticosteroids as soon as possible.

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Responses Correct:	0
Responses Incorrect:	5
Responses Total:	5
Responses - % Correct:	0%

A 26-year-old woman who is previously fit and well presents to the Emergency Department with pain behind the right eye, blurring and loss of colour vision since waking from sleep. Visual acuity testing reveals deterioration from 6/6 to 6/18; visual fields are normal. There is a relative afferent pupillary defect, and fundoscopy suggests mild optic disc swelling. ESR is mildly raised at 48mm/1st hr, and other blood tests are unremarkable.

Which of the following is the most likely diagnosis?

A	Acute glaucoma
B	Central retinal artery occlusion
C	Central retinal vein occlusion
D	Meningioma
E	Optic neuritis

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Calculator

Normal Values

A 26-year-old woman who is previously fit and well presents to the Emergency Department with pain behind the right eye, blurring and loss of colour vision since waking from sleep. Visual acuity testing reveals deterioration from 6/6 to 6/18; visual fields are normal. There is a relative afferent pupillary defect, and fundoscopy suggests mild optic disc swelling. ESR is mildly raised at 48mm/1st hr, and other blood tests are unremarkable.

Which of the following is the most likely diagnosis?

A	Acute glaucoma
B	Central retinal artery occlusion
C	Central retinal vein occlusion
D	Meningioma
E	Optic neuritis

Explanation

The rapid deterioration in vision, particularly the loss of colour vision, with no significant past medical history and mild optic disc swelling raises the possibility of optic neuritis. Normal fundoscopy or only minor changes (as here) may be seen in the initial stages of the condition. Of note with respect to treatment is that intravenous corticosteroids have not been shown to impact on visual outcomes versus observation only.

There are no risk factors to suggest increased probability of central retinal artery occlusion, (characterised by a pale retina and cherry red spot) or central retinal vein occlusion, characterised by flame shaped retinal haemorrhages. The history is far too acute to suggest meningioma.

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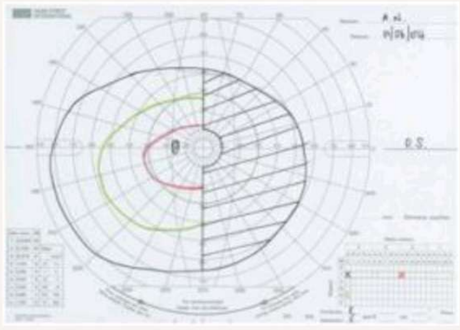
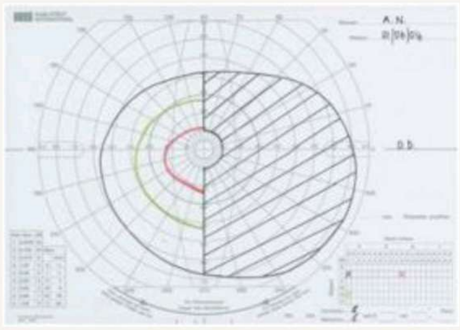
Responses Correct:	0
Responses Incorrect:	6
Responses Total:	6
Responses - % Correct:	0%

Study the Goldmann visual field test results shown below;

Left eye;



Right eye;



Where is the pathological lesion?

A	Left occipital cortex
B	Left temporal lobe (Meyer's loop)
C	Right occipital cortex
D	Right optic nerve
E	Right parietal lobe

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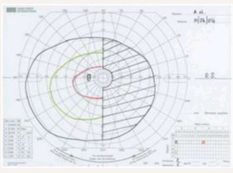
Calculator

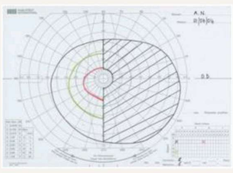
Normal Values

Study the Goldmann visual field test results shown below;

Left eye;



Right eye;



Where is the pathological lesion?

A	Left occipital cortex
B	Left temporal lobe (Meyer's loop)
C	Right occipital cortex
D	Right optic nerve
E	Right parietal lobe

Explanation

A	Left occipital cortex

By convention visual fields are recorded as what the patient sees. Therefore the right eye is on the right and the left eye on the left. They should be labelled to avoid confusion, but the position of the blind spots tells one which eye is which. Most other recordings of a clinical examination are recorded as if one is looking at the patient.

These fields show a homonymous hemianopia with macular sparing. The calcarine cortex, at the occipital lobe receives its blood supply from the two posterior cerebral arteries. The tip of the occipital pole, however, receives a dual blood supply via the middle cerebral artery. It is at the tip that macular vision is represented. Thus, with a stroke affecting the posterior cerebral artery (here on the left side) a homonymous hemianopia to all vision on the right occurs, but the patient will fortunately be able to read as macula vision is spared.

B	Left temporal lobe (Meyer's loop)

A lesion in Meyer's loop the longer radiation that passes from the lateral geniculate nucleus into the temporal pole before passing back to the occipital cortex– affects the upper part of the field and thus the patient would have a right homonymous upper quadrantanopia.

C	Right occipital cortex

For reasons described above, a lesion affecting the right occipital cortex would cause a left homonymous hemianopia with macular sparing. If a patient with a left posterior cerebral artery occlusion subsequently develops a right posterior cerebral artery occlusion, the patient would be left with the peculiarity of 'gunbarrel' fields: the patient may not be able to see a door, but can see a pin– this may arouse suspicion of hysteria in the unwary physician.

D	Right optic nerve

Damage to the right optic nerve would cause unilateral blindness.

E	Right parietal lobe

Parietal lobe lesions are the converse of this and affect vision below the level of the eye, producing a left homonymous lower quadrantanopia.

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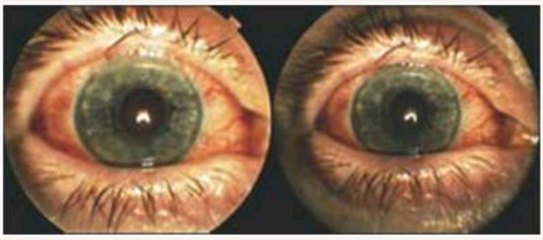
Responses Correct:	0
Responses Incorrect:	7
Responses Total:	7
Responses - % Correct:	0%

The surgical registrar calls you at 11pm to see a 72-year-old Chinese lady. She is under the general surgeons, being investigated for possible bowel obstruction because of severe nausea and vomiting. She is vomiting every half-hour and complains of progressive visual loss in the right eye during the course of the evening as well as redness and pain. She noticed that for the preceding few days she has seen halos round street lamps. She does not smoke, only drinks rarely and lives on her own except that recently she has purchased a cat. You do not have a Snellen or a Jaeger chart but on using a magazine, her acuity is better in the left than in the right eye.

On inspection there is a shallow anterior chamber, a semi-dilated, fixed pupil and the appearance is shown below. There is a little clear discharge.



Her blood results were:

FBC	Normal
ESR	29 mm/1st hour
Sodium	131 mmol/l
Potassium	3.2 mmol/l
Bicarbonate	34 mmol/l
Chloride	99 mmol/l
Urea	6.9 mmol/l
Creatinine	110mmol/l

Which of the following is the most likely underlying diagnosis?

A	Conjunctivitis
B	Acute angle-closure glaucoma
C	Acute anterior uveitis
D	Primary open-angle glaucoma
E	Scleritis

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Calculator

Normal Values

The surgical registrar calls you at 11pm to see a 72-year-old Chinese lady. She is under the general surgeons, being investigated for possible bowel obstruction because of severe nausea and vomiting. She is vomiting every half-hour and complains of progressive visual loss in the right eye during the course of the evening as well as redness and pain. She noticed that for the preceding few days she has seen halos round street lamps. She does not smoke, only drinks rarely and lives on her own except that recently she has purchased a cat. You do not have a Snellen or a Jaeger chart but on using a magazine, her acuity is better in the left than in the right eye.

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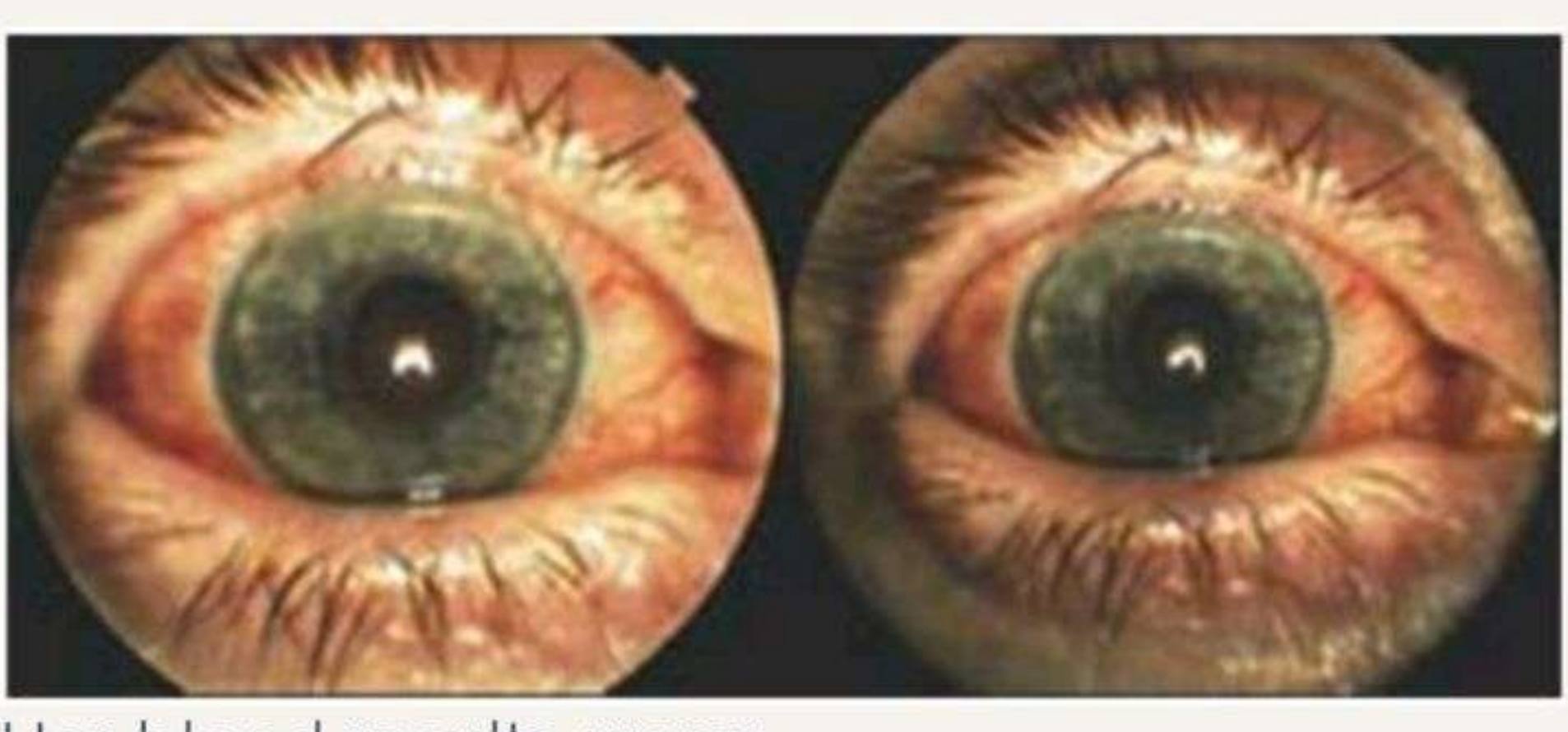

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Urea	6.9 mmol/l
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Which of the following is the most likely underlying diagnosis?

A Conjunctivitis

B Acute angle-closure glaucoma

C Acute anterior uveitis

D Primary open-angle glaucoma

E Scleritis

Explanation

B Acute angle-closure glaucoma

This is a classic story for acute angle-closure glaucoma. It is a disease of middle to later life. An acute uniocular attack like this is often preceded by a short period of blurred vision, often with halos round lights– particularly at night-time.

Pain is a variable feature–it can be so severe and, along with the elevation in the intraocular pressure, cause nausea and vomiting such that the patient is assumed to harbor gastrointestinal pathology, such as an obstruction.

Acuity is reduced, the cornea appears hazy due to oedema, there is often a ciliary flush, and the pupil is fixed, often midpoint/dilated and ovoid.

If the anterior chamber is viewed from the side with a torch or a slit lamp, half the iris may be seen to be in shadow and this suggests the iris is bulging forward due to the pressure in the posterior chamber resulting from the obstructed flow of aqueous - this is the shallow anterior chamber.

A 'ciliary flush' refers to dilatation of the deep conjunctival and episcleral vessels adjacent and circumferential to the corneal limbus. It is best seen in natural light. It suggests either anterior uveitis or glaucoma. If suspected, it requires immediate assessment by an ophthalmologist as the optic nerve can be permanently damaged by delay.

The pressure in the both eyes must be measured, and the elevated pressure reduced. This is done with pilocarpine 2–4% drops hourly (meiosis opens the blocked closed draining angle); Acetazolamide is given to stop the production of aqueous, usually orally, or intravascularly if they are vomiting (intramuscular injection is not favoured as it is alkaline and often painful).

Peripheral iridectomy (either by laser or surgically) is performed once the pressures are normal– it is rarely necessary as an emergency, if medical therapy fails to control the pressure. Mydriatics must not be used as these will further increase the block at the 'closed'angle.

A Conjunctivitis

Conjunctivitis does not cause perilimbic (within 3mm of the cornea) dilatation.It is usually itchy and is the only cause of a red eye that is so. It is not truly painful and neither vision, reflexes or movements are affected.

C Acute anterior uveitis

Anterior uveitis tends to cause a deep boring pain, of acute onset, photophobia (because of iris spasm), blurred vision due to precipitates in the aqueous, lacrimation, circumcorneal redness (ciliary flush), and a small pupil (again because of iris spasm) that may in time become irregular or dilate irregularly due to adhesion formation. Pus may be seen in the anterior chamber (hypopyon) with a slit lamp. It tends to affect young or middle-aged patients, and is associated with arthritides, such as Still's disease and ankylosing spondylitis.

D Primary open-angle glaucoma

Primary open-angle glaucoma is a chronic disease, which is usually asymptomatic. It is typically associated with a triad of:
1) raised intraocular pressure,
2) pathological changes in the optic disc,
3) visual field defects.

The anterior chamber of the eye is deep, with open-angles, and normal pupil reflexes.

E Scleritis

Scleritis is inflammation of the sclera of the white, leading to a constant, deep, boring pain, which can often wake patients at night. The eye may be very tender to touch. It may be associated with focal or diffuse erythema of the sclera. It is commonly associated with underlying connectivetissue diseases (~50% of cases). In contrast to acute angle-closure glaucoma, the anterior chamber is typically deep and the pupil reflexes are typically normal.

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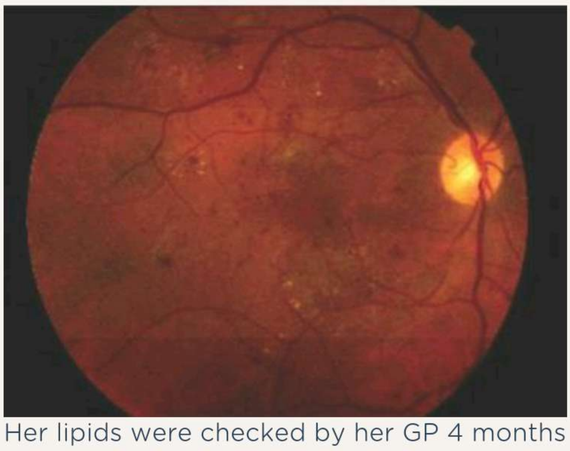
Responses Total:	8
Responses - % Correct:	0%

A 65-year-old overweight Asian lady was referred to Ophthalmology Outpatients with general malaise and a gradual reduction in vision of 3months'duration, affecting both eyes. Aided Snellen visual acuity was recorded as 6/18 right eye, 6/12 left eye, both eyes improving to 6/9 with a pinhole. Dilated examination revealed bilateral, moderate nuclear sclerosis, and widespread retinal changes as shown below.



Her lipids were checked by her GP 4 months before:

Cholesterol	6mmol/l
HDL	0.79mmol/l
LDL	4.0mmol/l
Fasting triglycerides	4.6mmol/l

Which of the following is the most likely underlying diagnosis?

A	Ankylosing spondylitis
B	Diabetes mellitus
C	Hyperlipidaemia
D	Multiple sclerosis
E	Sarcoidosis

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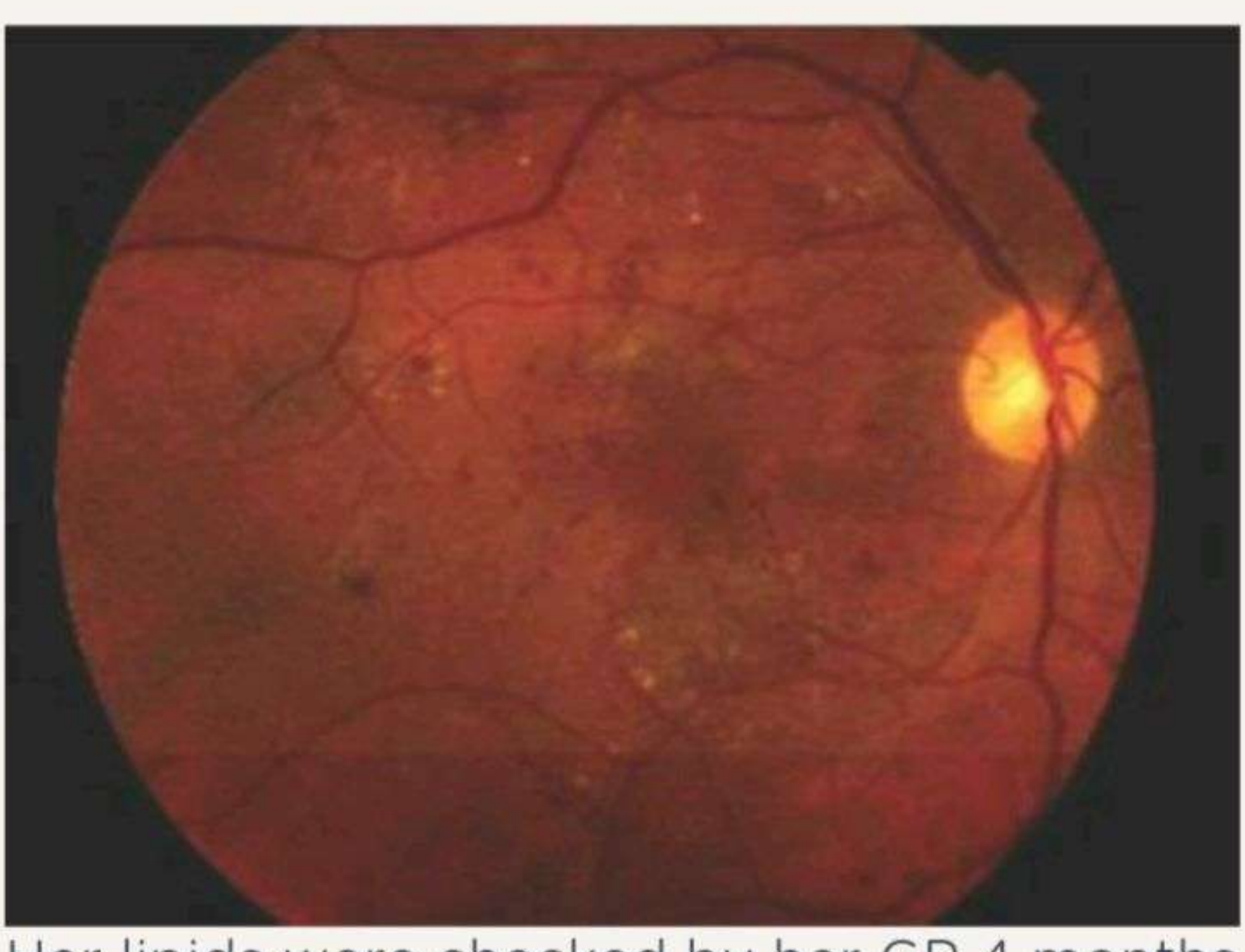
Calculator

Normal Values

A 65-year-old overweight Asian lady was referred to Ophthalmology Outpatients with general malaise and a gradual reduction in vision of 3months'duration, affecting both eyes. Aided Snellen visual acuity was recorded as 6/18 right eye, 6/12 left eye, both eyes improving to 6/9 with a pinhole. Dilated examination revealed bilateral, moderate nuclear sclerosis, and widespread retinal changes as shown below.



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Which of the following is the most likely underlying diagnosis?

A Ankylosing spondylitis

B Diabetes mellitus

C Hyperlipidaemia

D Multiple sclerosis

E Sarcoidosis

Explanation

B Diabetes mellitus

This is a slide of diabetic pre-proliferative diabetic retinopathy. There are extensive dot and blot haemorrhages; there are hard exudates, including a circinate exudates at 11o'clock to the macula; cotton-wool spots are just seen, superior to the macula and superotemporal vascular arcade; There is a large blot haemorrhage superiorly; the arteries are tortuous and fine and the veins are irregular with beading.

None of this would affect acuity per se – in this case as evidenced by the satisfactory acuity with pinhole correction; a loss of acuity would imply maculopathy.

A refractive error, or in this case lens opacity is reducing visual acuity, which subsequently improves with pinhole correction. This is difficult to appreciate from direct fundoscopy but one can sometimes get a sense that the physiological foveal pit reflex is lost, and the macula appears boggy and oedematous.

Fluorescein angiography can demonstrate extensive capillary leak at the macula and show the true extent of the vascular abnormalities, including intra retinal micro aneurysms (another pre-proliferativefeature).Retinal imaging with optical coherence tomography (OCT) allows precise measurement of macular oedema, if present. Direct fundoscopy is not always entirely satisfactory at detecting retinopathy. Fluorescein angiography is the gold standard.

Retinal photography should be performed for screening, and in the UK this is undertaken by opticians and optometrists. In this case, however, one should pick up the evident disease. The proximity of red disease (dots and blots) to the macula is not worrying, and can be followed up, but hard exudates (lipid-laden macrophages) and cotton-wool spots (retinal ischaemia – which stimulates new vessel formation) near the macula warrant a referral to an ophthalmologist, particularly if extensive. Any loss of acuity – even if the fundus looks normal – suggests maculopathy and warrants referral.

A Ankylosing spondylitis

Ankylosing spondylitis is associated with anterior uveitis.

C Hyperlipidaemia

Hypertriglyceridaemia is rarely associated with the appearance of lipaemia retinal is where the vessels look milky. Hypercholesterolaemia, whether combined or solitary, can rarely be associated with retinal ischaemia, but only because of proximal arterial occlusion. These lipids are in keeping with a diabetic dyslipidaemia and the triglycerides are not high enough to cause lipaemia retinalis.

D Multiple sclerosis

Multiple sclerosis causes optic neuritis. If behind the eye – so-called "retrobulbar", this could only be appreciated as scotomas or loss of acuity and optic atrophy on fundoscopy. If at the eye, papillitis may occur where the eye is painful, with or without photophobia, and the disc looks swollen and pink.

E Sarcoidosis

Sarcoidosis can cause a retinal vasculitis or anterior uveitis.

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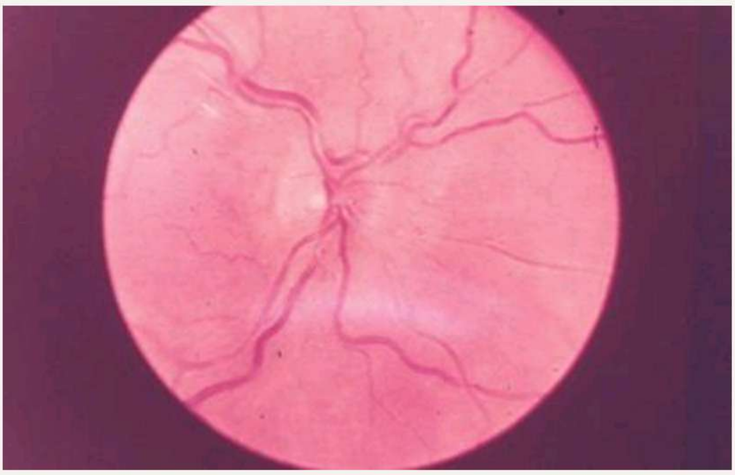
Responses Correct:	0
Responses Incorrect:	9
Responses Total:	9
Responses - % Correct:	0%

A 65-year-old man presents to the Emergency Department with reduced vision in the right eye noticed while taking a photograph.

On examination he has a right afferent pupillary defect and the following appearance on fundoscopy;



What is the most likely underlying diagnosis?

A	Toxoplasma chorioretinitis
B	Hypertensive retinopathy
C	Central retinal vein occlusion
D	Branch retinal artery occlusion
E	Multiple sclerosis

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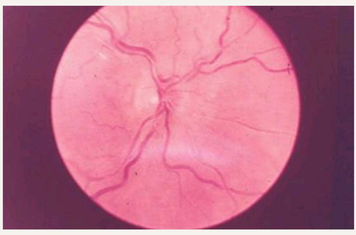
Calculator

Normal Values

A 65-year-old man presents to the Emergency Department with reduced vision in the right eye noticed while taking a photograph.

On examination he has a right afferent pupillary defect and the following appearance on fundoscopy;



What is the most likely underlying diagnosis?

A	Toxoplasma chorioretinitis
B	Hypertensive retinopathy
C	Central retinal vein occlusion
D	Branch retinal artery occlusion
E	Multiple sclerosis

Explanation

B	Hypertensive retinopathy

The slide shows a fundus with a grade 4 hypertensive retinopathy with optic disc oedema, cotton-wool spots and widespread A-V nipping. The retina looks oedematous. The other features one may see are flame-shaped retinal haemorrhages and hard exudate; which may collect around the fovea producing a 'macula star'. The presence of end-organ damage like this dictates the urgency with which this condition is managed. Obviously the blood pressure needs to be recorded and controlled. The diagnosis of hypertensive retinopathy is made by the presence of these retinal features in association with severely raised blood pressure.

A	Toxoplasma chorioretinitis

This is not the appearance of chorioretinitis (which may be caused by Toxoplasma), or dysthyroid eye disease. The latter can cause optic atrophy from optic nerve compression if there is increased pressure in the orbit.

C	Central retinal vein occlusion

Although central retinal vein occlusions are commonly associated with high blood pressure, they have a different clinical appearance to that seen here. They typically present with severe unilateral visual loss associated with retinal haemorrhages distributed around all four quadrants of the retina (in severe cases, this is referred to as a "blood and thunder" fundus appearance).

D	Branch retinal artery occlusion

Branch retinal artery occlusions are also seen in patients with hypertension and other cardiovascular risk factors. Patients typically present with a sudden, painless altitudinal visual field defect. However, they are typically associated with whitish opacification of a region of the retina corresponding to the area of vascular occlusion. On careful examination, emboli can often be seen at the point of vascular occlusion - the commonest emboli are 1) cholesterol, 2) fibrinoplatelet, 3) calcific.

E	Multiple sclerosis

Multiple sclerosis may cause papillitis, with blurring of the optic disc margins. However, it typically occurs in younger patients and is not commonly associated with retinal haemorrhages or exudates.

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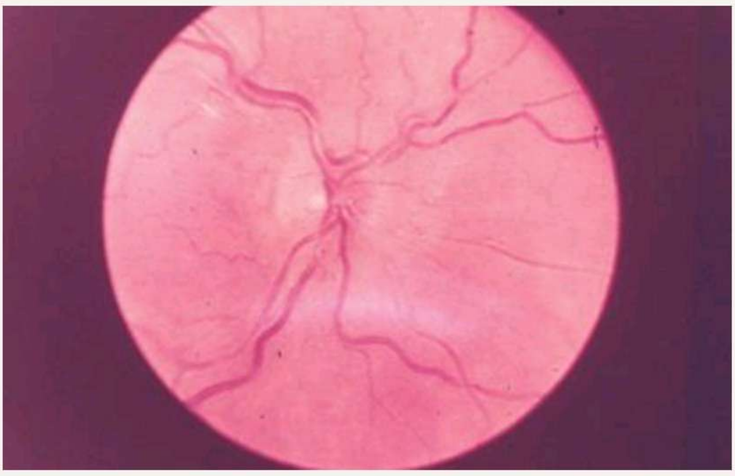
Session Progress

Responses Correct:	0
Responses Incorrect:	10
Responses Total:	10
Responses - % Correct:	0%

A 65-year-old man presents to the Emergency Department with reduced vision in the right eye noticed while taking a photograph.

On examination he has a right afferent pupillary defect and the following appearance on fundoscopy;



Which one of the following should be undertaken soon?

A	Blood pressure measurement
B	Thyroid function
C	Chest X-ray
D	Referral for fluorescein angiography
E	Carotid Doppler

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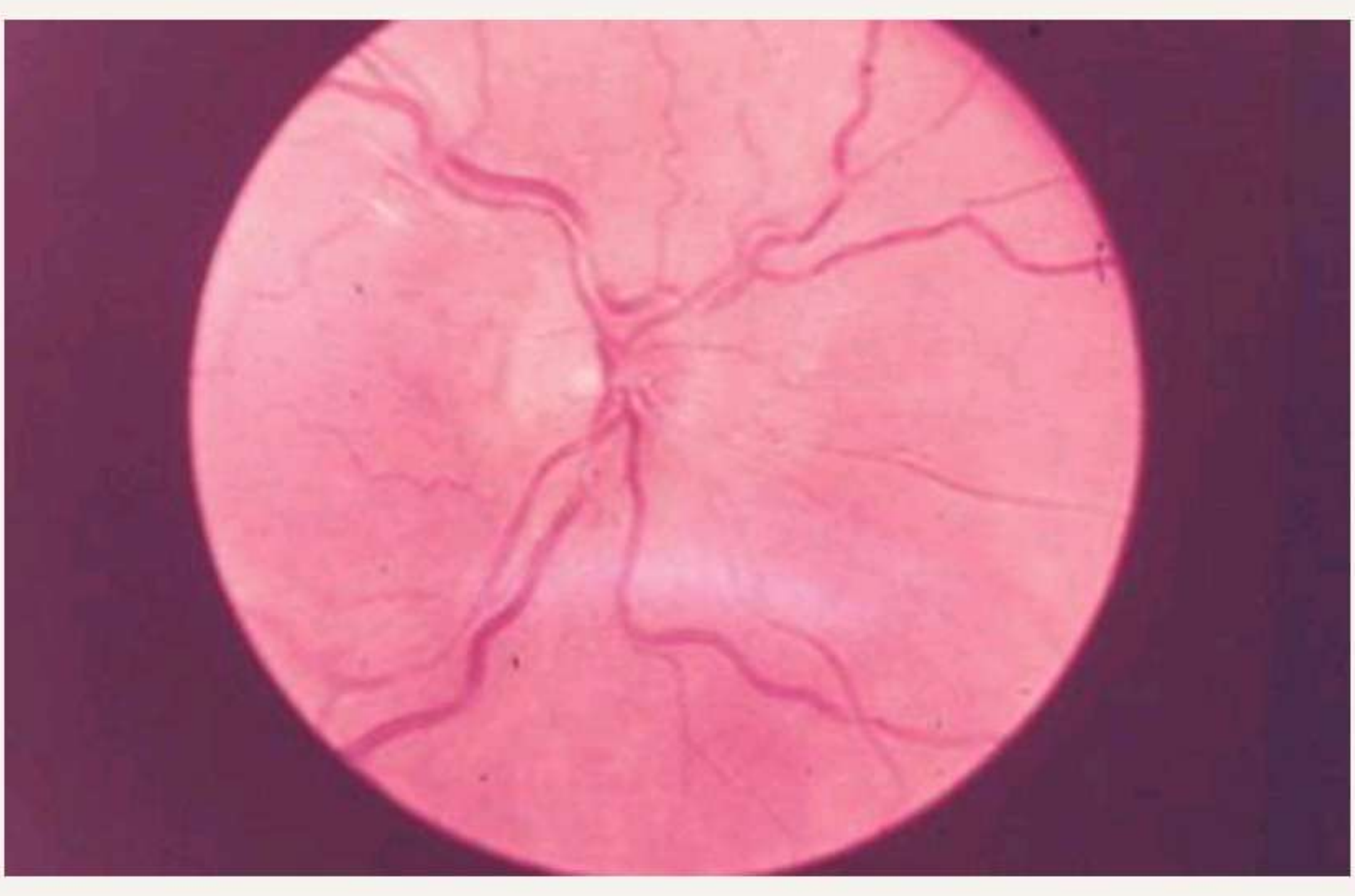
Calculator

Normal Values

A 65-year-old man presents to the Emergency Department with reduced vision in the right eye noticed while taking a photograph.

On examination he has a right afferent pupillary defect and the following appearance on fundoscopy;



Which one of the following should be undertaken soon?

A	Blood pressure measurement
B	Thyroid function
C	Chest X-ray
D	Referral for fluorescein angiography
E	Carotid Doppler

Explanation

A	Blood pressure measurement

The slide shows a fundus with grade 4 hypertensive retinopathy with optic disc oedema, cotton-wool spots and widespread A-V nipping. The retina looks oedematous. The other features one may see are
flame-shaped retinal haemorrhages and hard exudate; which may collect around the fovea producing a 'macula star'. The presence of end-organ damage like this dictates the urgency with which this condition is managed. Obviously the blood pressure needs to be recorded and optimally controlled. The diagnosis of hypertensive retinopathy is made by the presence of these retinal features in association with severely raised blood pressure.

Considering the other consequences of hypertension the following ought also to be done: urinalysis, CXR, and ECG +/- echo to look for renal damage and LVH/strain respectively. More broadly one must consider not only the consequences of the hypertension but also its causes, such as renal or endocrine disease.

B	Thyroid function

This is not the appearance chorioretinitis which may be caused by Toxoplasma, or dysthyroid eye disease. The latter can cause optic atrophy from optic nerve compression if there is increased pressure in the orbit.

C	Chest X-ray

A CXR needs to be done but not at the expense of everything else here.

D	Referral for fluorescein angiography

Fluorescein angiography is not required to make the diagnosis.

E	Carotid Doppler

The presence of a carotid bruit does not dictate the need to do an urgent carotid doppler ultrasound.

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Responses Total:	11
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A 31-year-old housewife attends the diabetic clinic for her annual review. She has been an insulin-dependent diabetic for 8 years and her blood sugar level is usually between 5 and 9 mmol/l. She leads a sedentary lifestyle, is obese and smokes about 10 cigarettes/day. On examination her blood pressure is 140/95 mmHg and her pulse is 68 bpm and regular.

Blood results:

Hb	13.4 g/dl
WCC	5.2×10^9/l
MCV	78 fl
plts	214×10^9/l
Hb A_{1c}	8.5 of the Hb fraction
Na	135 mmol/l
K	4.0 mmol/l
urea	7.3 mmol/l
creatinine	131 mmol/l
24-hour urine protein	30 mg
Fundoscopy	normal

How often would you screen this patient for retinopathy?

A	Every 2 years
B	Every 6 months
C	Annually
D	No need for screening for the next 5 years
E	Screening only when she has visual symptoms

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Calculator

Normal Values

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Explanation

All people with Type 1 and Type 2 diabetes are offered annual retinal screening under the NHS Diabetic Retinopathy screening program. Those patients with diabetic retinopathy are followed up more frequently via the Ophthalmology service.

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Responses Correct:	0
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Responses Total:	12
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A 54-year-old woman with type-2 diabetes mellitus has been referred to the diabetic clinic by her GP for difficulty in reading small print. This visual problem had gradually developed over several months. She has been diabetic for 11 years and has been controlled by metformin. The patient is obese and smokes 15 cigarettes a day. She has a past medical history of hypertension and hyperlipidaemia and takes atenolol 50 mg od. On examination her blood pressure was 140/85 mmHg and her pulse was 66 bpm and regular. Fundoscopy reveals non-proliferative diabetic retinopathy (NPDR) and some hard exudates one-disc diameter from the macula. Her HbA1C was 63.93 mmol/mol (8.0%).

How would you best manage this patient with respect to the eye changes?

A	Non-urgent referral to an ophthalmologist for consideration of photocoagulation therapy
B	Screen the patient every 6 months for close follow up
C	Screen the patient annually for early detection and treatment of proliferative retinopathy
D	Advice the patient to see an optician for spectacles
E	Add a sulphonylurea to the drug treatment

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Calculator

Normal Values

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Explanation

This patient would need a non-urgent referral to an ophthalmologist for photocoagulation, which will stabilize visual acuity because of disease close to the macula and an adverse risk profile, particularly characterised by her obesity and continued smoking. The ability to alter the course of visual loss in diabetic macular involvement favourably is a major advance. The patient should be cautioned that the most likely result of treatment is stabilisation, not improvement, of her visual acuity.

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Responses Correct:	0
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Responses Total:	13
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A 54-year-old woman with type-2 diabetes mellitus has been referred to the diabetic clinic by her GP for difficulty in reading small print. This visual problem had gradually developed over several months. She has been diabetic for 11 years and has been controlled by diet alone. The patient is obese and smokes 15 cigarettes a day. She has a past medical history of hypertension and hyperlipidaemia and takes atenolol 50 mg od. On examination her blood pressure was 135/85 mmHg and her pulse was 66 bpm and regular. Fundoscopy reveals non-proliferative diabetic retinopathy (NPDR). Her FBC and U/Es are normal. Her HbA1C was 63.93 mmol/mol (8.0%).

What is the most likely outcome of replacing diet by drug treatment in this patient?

A	Intensive blood glucose control would significantly decrease the risk of macrovascular disease
B	Intensive blood glucose control would lead to a reduction in the progression of retinopathy and deterioration of visual acuity
C	Intensive blood glucose control would reverse the progression of the retinopathy and improve her vision
D	Metformin would increase fasting plasma insulin
E	Metformin would be associated with less weight gain but with frequent hypoglycaemic episodes

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Calculator

Normal Values

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Explanation

The United Kingdom Prospective Diabetes Study (UKPDS) was designed to establish whether intensive blood glucose control was of benefit in reducing the microvascular and macrovascular complications of type-2 diabetes. It also studied the outcome with different treatments. Diabetic control was assessed by measurements of Hb A_{1c} and was found to be significantly better in drug treatment groups than those treated by diet alone. There was a 25% risk reduction of developing microvascular complications in the drug-treated groups compared to those on diet alone. However, intensive blood glucose control did not significantly decrease the risk of macrovascular disease or mortality at the original 10 year follow up timepoint.

A study comparing metformin with diet in overweight type-2 diabetics revealed a risk reduction in any diabetes-related endpoint, diabetes-related death or mortality from any cause in the metformin-treated group. Improved glucose control was achieved without weight gain. Metformin lowers fasting plasma insulin but enhances insulin sensitivity, thereby increasing peripheral uptake of glucose.

The UKPDS showed that the control of hypertension in type-2 diabetics led to a reduction in diabetes-related deaths and complications, including progression to retinopathy and deterioration in visual acuity.

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Responses Total:	14
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A 42-year-old woman is undergoing investigations to confirm a suspected diagnosis of multiple sclerosis. As part of her work up she is referred to the local ophthalmology department for an examination of her eyes.

Which of the following eye signs is least likely to be found in a patient with multiple sclerosis?

A	Visual field defect
B	Optic atrophy
C	Ptosis
D	Normal abduction in left eye and failure of adduction in the right eye on left gaze
E	Nystagmus

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Normal Values

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A	Visual field defect
B	Optic atrophy
C	Ptosis
D	Normal abduction in left eye and failure of adduction in the right eye on left gaze
E	Nystagmus

Explanation

Multiple sclerosis (MS) is a chronic, idiopathic, relapsing/remitting inflammatory demyelinating disorder that causes plaques of demyelination at sites throughout the CNS. It tends to be commoner in temperate climates - adult travellers take their risk with them, but children under the age of 15 acquire the risk of the climate they settle in. Throughout adulthood the female : male ratio is 2 : 1.

The main ways in which MS can present include optic neuritis, leg weakness, numbness or tingling in the extremities due to involvement of the posterior columns or brainstem or cerebellar symptoms and signs such as diplopia, nystagmus, ataxia and vertigo. Uhthoff's symptom is exacerbation of the clinical features of MS during a hot bath.

With respect to the eye, signs that may be seen include optic atrophy following repeated episodes of optic neuritis, which in turn may cause a permanent visual field defect, diplopia, nystagmus, internuclear ophthalmoplegia, abnormal pupillary responses and/or the loss of smooth eye pursuit movement. MS very rarely causes isolated IIIrd nerve dysfunction (outwith the context of internuclear ophthalmoplegia) and as such ptosis would be an extremely unusual sign.

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